WHAT IS CLAIMED IS:

1. A method for implementing MAC (Media Access control) in an Ethernet passive optical network system, comprising the steps of:

providing an Ethernet frame comprising:

a preamble;

a DA (Destination Address) field for indicating a destination address;

an SA (Source Address) field for indicating a source address;

an L/T (Length/Type) field for indicating a type and length of the Ethernet frame;

a data/PAD (Packet Assembly and Disassembly) field for indicating data of the Ethernet frame; and

an FCS (Frame Check Sequence) field which is positioned at an end of the frame and used for detecting an error of the frame when information divided on a frame-by-frame basis is transmitted in data communication; and

reconfiguring the frame with, as an additional field, an LLID (Logical Link ID) field for indicating a logical link identifier,

wherein the reconfigured frame is transferred to the data link layer so that the data link layer uses the LLID field to enable logical MAC emulation.

2. The method as set forth in claim 1, wherein the Ethernet frame further comprises an E type field for indicating information of an Ether type.

3. A method for implementing MAC (Media Access control) in an Ethernet passive optical network system, the method comprising the steps of:

(a) causing a physical layer of the Ethernet passive optical network system to contain LLID (Logical Link ID) information within a preamble and transfer the preamble containing the LLID information;

(b) causing an RS (Reconciliation Sublayer) to configure a new Ethernet frame with said preamble and by inserting the LLID information at a predetermined position of the Ethernet frame outside said preamble, and causing the RS to transfer the new Ethernet frame up to a data link layer of the Ethernet passive optical network system; and

(c) causing said data link layer to transfer said new Ethernet frame.

4. The method as set forth in claim 3, wherein the new Ethernet frame comprises:

a DA (Destination Address) field for indicating a destination address;

an SA (Source Address) field for indicating a source address;

an LLID field for indicating a logical link identifier;

an L/T (Length/Type) field for indicating a type and length of the Ethernet frame;

a data/PAD (Packet Assembly and Disassembly) field for indicating data of the Ethernet frame; and

an FCS (Frame Check Sequence) field which is positioned at an end of the frame and used for detecting an error of the frame when information divided on a frame-by-frame basis is transmitted in data communication,

wherein the frame in which the LLID field is positioned is transferred to the data

link layer so that the data link layer enables logical MAC emulation.

5. The method as set forth in claim 4, wherein the new Ethernet frame further comprises an E type field for indicating information of an Ether type.

6. The method as set forth in claim 5, wherein the step (b) comprises the steps of:

(b-1) causing the RS to receive an Ethernet packet from the physical layer;

(b-2) causing the RS to determine whether an error exists within the preamble of the Ethernet packet received at the step (b-1);

(b-3) if an error exists within the preamble as a result of the determination at the step (b-2), discarding the Ethernet packet and reporting the error of the preamble;

(b-4) if no error exists within the preamble as the result of the determination at the step (b-2), determining whether an error exists within the Ethernet frame of the Ethernet packet;

(b-5) if an error exists within the Ethernet frame as a result of the determination at the step (b-4), reporting the error of the Ethernet frame;

(b-6) if no error exists within the Ethernet frame as the result of the determination at the step (b-4), extracting the LLID information contained in the preamble and configuring the new Ethernet frame by inserting the LLID information at a predetermined position of the Ethernet frame outside the preamble; and

(b-7) processing an FCS of the new Ethernet frame and transferring a new Ethernet packet.

7. The method as set forth in claim 4, wherein the step (b) comprises the steps of:

(b-1) causing the RS to receive an Ethernet packet from the physical layer;

(b-2) causing the RS to determine whether an error exists within the preamble of the Ethernet packet received at the step (b-1);

(b-3) if an error exists within the preamble as a result of the determination at the step (b-2), discarding the Ethernet packet and reporting the error of the preamble;

(b-4) if no error exists within the preamble as the result of the determination at the step (b-2), determining whether an error exists within the Ethernet frame of the Ethernet packet;

(b-5) if an error exists within the Ethernet frame as a result of the determination at the step (b-4), reporting the error of the Ethernet frame;

(b-6) if no error exists within the Ethernet frame as the result of the determination at the step (b-4), extracting the LLID information contained in the preamble and configuring the new Ethernet frame by inserting the LLID information at a predetermined position of the Ethernet frame outside the preamble; and

(b-7) processing an FCS of the new Ethernet frame and transferring a new Ethernet packet.

8. The method as set forth in claim 7, wherein, if the FCS is disabled, the step (b-7) is carried out by transferring the new Ethernet packet to a higher layer without updating the FCS.

9. The method as set forth in claim 7, wherein, if the FCS is enabled, the step (b-7) is carried out by updating the FCS, inserting the updated FCS into the new Ethernet frame and transferring the new Ethernet packet to a higher layer.

10. The method as set forth in claim 6, wherein, if the FCS is disabled, the step (b-7) is carried out by transferring the new Ethernet packet to a higher layer without updating the FCS.

11. The method as set forth in claim 6, wherein, if the FCS is enabled, the step (b-7) is carried out by updating the FCS, inserting the updated FCS into the new Ethernet frame and transferring the new Ethernet packet to a higher layer.

12. A method for implementing MAC (Media Access control) in an Ethernet passive optical network system, comprising the steps of:

(a) causing a data link layer of the Ethernet passive optical network system to transfer an Ethernet frame containing LLID (Logical Link ID) information;

(b) causing an RS (Reconciliation Sublayer) to extract the LLID information contained in the Ethernet frame and configure a standard-based Ethernet frame by inserting the LLID information in a preamble, and causing the RS to transfer the standard-based Ethernet frame to a lower physical layer of the Ethernet passive optical network system; and

(c) causing the physical layer to transfer the preamble containing the LLID

information.

13. The method as set forth in claim 12, wherein the Ethernet frame containing LLID information comprises:

a DA (Destination Address) field for indicating a destination address;

an SA (Source Address) field for indicating a source address;

an LLID field for indicating a logical link identifier;

an L/T (Length/Type) field for indicating the Ethernet frame's length and type;

a data/PAD (Packet Assembly and Disassembly) field for indicating data of the Ethernet frame; and

an FCS (Frame Check Sequence) field which is positioned at an end of the frame and used for detecting an error of the frame when information divided on a frame-by-frame basis is transmitted in data communication,

wherein said frame containing LLID information is transferred to the data link layer so that the data link layer uses the LLID field to enable logical MAC emulation.

14. The method as set forth in claim 13, wherein said Ethernet frame containing LLID information further comprises an E type field for indicating information of an Ether type.

15. The method as set forth in claim 14, wherein the step (b) comprises the steps of:

(b-1) causing the RS to receive the Ethernet frame from the physical layer;

(b-2) causing the RS to extract the LLID information from the received Ethernet frame and insert the extracted LLID information within the preamble;

(b-3) producing an FCS associated with the standard-based Ethernet frame from which CRC information and the LLID information are removed, and updating the CRC and LLID information within the standard-based Ethernet frame; and

(b-4) transferring the Ethernet packet with the standard-based Ethernet frame containing the updated CRC and FCS information to the physical layer.

16. The method as set forth in claim 13, wherein the step (b) comprises the steps of:

(b-1) causing the RS to receive the Ethernet frame from the physical layer;

(b-2) causing the RS to extract the LLID information from the received Ethernet frame and insert the extracted LLID information within the preamble;

(b-3) producing an FCS associated with the standard-based Ethernet frame from which CRC information and the LLID information are removed, and updating the CRC and LLID information within the standard-based Ethernet frame; and

(b-4) transferring the Ethernet packet with the standard-based Ethernet frame containing the updated CRC and FCS information to the physical layer.

17. A computer-readable recording medium having, recorded within, a program executable by a processor of an Ethernet passive optical network system, the program comprising:

(a) instructions which, when executed by said processor, cause a physical layer of

the Ethernet passive optical network system to contain LLID (Logical Link ID) information within a preamble and transfer the preamble containing the LLID information;

(b) instructions which, when executed by said processor, cause an RS (Reconciliation Sublayer) to configure a new Ethernet frame by inserting the LLID information at a predetermined position of the Ethernet frame outside the preamble, and cause the RS to transfer the new Ethernet frame to a higher data link layer of the Ethernet passive optical network system; and

(c) instructions which, when executed by said processor, cause the data link layer to transfer the new Ethernet frame containing the LLID information.

18. A computer-readable recording medium having, recorded within, a program executable by a processor of an Ethernet passive optical network system, the program comprising:

(a) instructions which, when executed by said processor, cause a data link layer of the Ethernet passive optical network system to transfer an Ethernet frame containing LLID (Logical Link ID) information;

(b) instructions which, when executed by said processor, cause an RS (Reconciliation Sublayer) to extract the LLID information contained in the Ethernet frame and configure a standard-based Ethernet frame by containing the LLID information in a preamble, and cause the RS to transfer the standard-based Ethernet frame to a lower physical layer of the Ethernet passive optical network system; and

(c) instructions which, when executed by said processor, cause the physical layer to

transfer the preamble containing the LLID information.

19. The medium as set forth in claim 18, wherein the Ethernet frame containing LLID information comprises:

a DA (Destination Address) field for indicating a destination address;

an SA (Source Address) field for indicating a source address;

an LLID field for indicating a logical link identifier;

an L/T (Length/Type) field for indicating the Ethernet frame's length and type;

a data/PAD (Packet Assembly and Disassembly) field for indicating data of the Ethernet frame; and

an FCS (Frame Check Sequence) field which is positioned at an end of the frame and used for detecting an error of the frame when information divided on a frame-by-frame basis is transmitted in data communication,

wherein said frame containing LLID information is transferred to the data link layer so that the data link layer uses the LLID field to enable logical MAC emulation.

20. The medium as set forth in claim 19, wherein said Ethernet frame containing LLID information further comprises an E type field for indicating information of an Ether type.